Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Advanced Television Systems and Their Impact on the Existing Broadcast Service	)	MM Docket No. 87-268
	)	
Review of Technical and Operational Requirements: Part 73-E, Television Broadcast Stations	)	
	)	
Reevaluation of the UHF Television Channel and Distance Separation Requirements of Part 73 of the Commission's Rules	)	

INITIAL COMMENTS OF MST

THE ASSOCIATION OF MAXIMUM
SERVICE TELECASTERS

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The Association of Maximum Service Telecasters ("MST") hereby responds to the Commission's Notice of Inquiry on Advanced Television Systems ("NOI"), 2 FCC Rcd. 5125 (1987).

INTRODUCTION

As noted in the NOI, MST and 57 other broadcast organizations and companies petitioned the Commission in February of this year to initiate a proceeding to explore the issues raised by the imminent introduction of advanced television systems ("ATV") to this country. The core concern expressed in this petition (hereinafter "Broadcast Petition") was the possibility that spectrum constraints would preclude local broadcasters from implementing an ATV

system which would be competitive with those developed for cable, DBS and VCRs. Broadcast Petition, at 18-21.[1/]

MST is gratified that the Commission has chosen to initiate the requested inquiry and has done so by means of such a careful and comprehensive NOI. MST also applauds the Commission's creation of a blue-ribbon Advisory Committee to advise the Commission on ATV system evaluation and develop recommendations to the Commission concerning ATV standards and spectrum requirements. MST intends to participate vigorously in the Advisory Committee's deliberations and to devote substantial resources to the Committee's activities.

The broad scope of the NOI demonstrates the importance and complexity of the task confronting local broadcasters and the Commission. Even at this early stage of ATV system development the potential of emerging ATV technologies to revolutionize television and transform the television industry is beyond question. Assessing this potential in any detail, however, requires analysis of a complex web of interrelated questions about the ultimate perceivable limits of television performance, the capabilities of specific ATV systems, the spectrum needs and

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1/ MST also joins in the comments filed by the National Association of Broadcasters in response to the Notice of Inquiry.

robustness of the proposed new transmission systems, and the costs and practical difficulties of implementing them.

A major industry effort to thoroughly, but expeditiously, resolve the issues raised in the NOI is already underway. Reliable answers to these numerous, complex and interrelated questions will require further system development, followed by system testing and evaluation, adoption of standards, and, finally, planning for implementation.

Current projections indicate that the requisite development and evaluation will require approximately two to three more years to complete. Accordingly, definitive answers to the questions in the NOI cannot be offered at this time; commenters can, however, supplement the NOI's description of what is currently known about ATV technology, and detail the industry efforts to address the remaining questions and promote the ability of local broadcasters to implement ATV systems as soon as the 1990s.

It is also possible at this early juncture to identify certain propositions that should guide these efforts and the Commission's inquiry into ATV:

1. <u>It is imperative that local broadcasters have the opportunity to provide ATV of a quality competitive with non-broadcast media.</u> As ATV technologies become available through non-broadcast video delivery systems they will significantly upgrade the standard of quality for

television. Local broadcasters should have the opportunity to implement ATV systems of competitive quality with that which will be available through other transmission media in both the near and long-term future. Preliminary research indicates that the required near-term improvements may include a wideaspect ratio, substantially increased vertical and horizontal static resolution, high-quality motion reproduction and compact disk-quality sound. Additional psychophysical testing is needed to define the relative and absolute significance of the potentially achievable improvements and systems.

2. Compatibility with existing receivers and broadcast channels must be among the most important goals in evaluating ATV systems. Consumers' $80 billion investment in NTSC receivers and the difficulties inherent in the transition to a non-NTSC compatible system require that compatibility with the NTSC-system rank very high in the constellation of desirable ATV system features. Equally important is compatibility with local broadcasters' existing 6 MHz channels. Neither form of compatibility should be sacrificed, nor should actions that might foreclose the implementation of a fully compatible system be taken in the absence of compelling evidence that doing so is essential to develop a local-broadcast ATV system of a quality comparable to alternative media.

3. Developmental, performance, spectrum and interference issues cannot be separated. The development and testing of new local broadcast transmission technologies, evaluation of ATV systems performance, assessment of spectrum availability, analysis of interference-protection standards, and estimation of transmission costs are not discrete, independently resolvable tasks but interrelated problems presenting complex and unavoidable trade-offs which must be addressed in a unified manner. In particular, the spectrum requirements for ATV cannot be determined until candidate ATV systems have been tested, their relative quality and performance (including their susceptibility to future enhancement) have been established, and interference-protection criteria have been developed for each such system.

4. Consideration of certain issues such as standards, flexible allocations, and interference-trading is premature. It would be counterproductive to adopt positions on such questions as appropriate standards for ATV compatibility, the continued viability of UHF taboos, and the compatibility of ATV with other transmission services until more is known about the specific spectrum needs and characteristics of the candidate ATV systems. Other proposals floated in the NOI, such as flexible allocation of

interference rights, must await the completion of the process of ATV system development and evaluation.

I. THE CONSEQUENCES OF THE ADVENT OF ATV TECHNOLOGY.

A. ATV Technologies Will Likely Redefine The Standard Of High-Quality Video Services.

At the heart of the Commission's ATV inquiry and the industry efforts outlined below is a realization that the commercial introduction of ATV technologies is imminent and will have significant consequences for all video media. See NOI, at ¶¶ 100, 101, Quest. 22, 23; Broadcast Petition at 18-21. For forty years broadcast NTSC has defined the standard of quality in television. It is now apparent that new receiver and transmission technologies will significantly upgrade and eventually supersede NTSC as the benchmark of video quality.

There is every reason to believe that these new technological capabilities will find rapid acceptance in the video marketplace. The rapid proliferation of color television; the shift of audiences (and advertising revenue) from AM radio to FM radio; the almost-instantaneous consumer acceptance of compact-disc recordings; and the recent introduction into the market of multi-channel broadcast television sound, and higher-than-broadcast resolution video-recording technologies are among the many signs pointing toward the overwhelming and growing preference of consumers for high-fidelity aural and video service. Early psychophysical studies confirm that viewers regard the

specific constellation of improvements offered by high definition television ("HDTV") to be a quantum step forward in television quality.2/

Producers as well as consumers are greeting the advent of HDTV with great enthusiasm. ATV systems comparable in quality to 35 mm film hold forth the prospect of numerous production and editing efficiencies and several feature-length productions utilizing the NHK HDTV production system have already been initiated. By more fully utilizing their capabilities, ATV will also enhance the value of the existing stock of 35 mm films. And wide-screen ATV systems are widely expected to be particularly well suited for sports programming.

In short, from the perspective of the consumer, the producer and the distributor, there is little reason to doubt the eventual transcendence of ATV and the demise of the current NTSC system. As many commentators have noted, the result could well be a transformation in broadcast quality as significant as that from black and white to color.

2/ See, e.g., B.L. Jones and L. E. Marks, "Picture Quality Assessment: A Comparison of Ratio and Ordinal Scales," SMPTE Journal (Dec. 1985); I Childs and R. Melwig, "HDTV Standard Setting on Psychophysical Bases," EBU Review, 282-86; Takashi Fujio, "High Definition Television Systems," Proceedings of the IEE, Vol. 73, No. 4 (April, 1985)

B. Without Appropriate Regulatory Action By The FCC, Local Broadcasters May Be Precluded From Delivering Competitive, High-Quality ATV Service.

If both the producer and the consumer demand ATV, it is virtually certain that the transmission media, the distributors of the video world, will be compelled to provide it.3/ To begin with, it is worth observing again that the market for delivery of video services to the home is unprecedentedly competitive. Commercial Television Deregulation, 98 F.C.C.2d 1076, 1086-87 (1984). Cable television systems already "pass by" almost 80% of all television households and cable penetration is almost 50%.4/ VCR penetration is now over 50% in all of the top ten broadcast markest and over 49% nationwide.5/

These industries are already developing plans to deliver ATV-quality video in order to enhance, or protect their competitive position. Japanese manufacturers plan to begin marketing MUSE receivers and VCRs in the United States

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3/ Communications Daily, October 22, 1987, at 9 (reporting that HBO believes VCR delivery of HDTV will require cable operators to implement ATV systems).

4/ Carriage of Television Broadcast Signals by Cable Television Systems, 1 FCC Rcd. 864, 883 (1986) ("Table 1" showing 76% of all homes passed and 47% penetration in 1986).

5/ Communications Daily, August 18, 1987, at 5 (reporting that A.C. Nielsen estimates VCR pentration reached 49.5% in July, 1987, surpassing cable penatration); Multichannel News, November 2, 1987, at 54 (reporting cable penatration by market).

by 1990. Super-VHS, a system with approximately 25% greater resolution than NTSC, is now commercially available. The National Cable Television Association and other cable organizations have been conducting tests to promote the delivery of improved resolution "Supercable" signals and MUSE by cable.6/

And there is no doubt that the non-broadcast media will have little difficulty in providing ATV. NHK, for example, has demonstrated its ability to distribute its MUSE system, the only currently operational ATV system, by both satellite and VCR.7/ And other tests have established that MUSE can be distributed successfully by cable as well.8/

As broadcasters stated in their petition, the rub for local broadcasters is they alone may not be able to carry the MUSE signal or, indeed, any wideband ATV system. Broadcast Petition at 19; NOI, at ¶¶ 83, 84, 100. The reason, of course, is the constraint of broadcasters' 6 MHz-wide channels and their unique dependence upon the

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6/ Communications Daily, October 14, 1987, at 4-5 (reporting consideration of Supercable as interim improvement for cable before implementing HDTV systems).

7/ Multichannel News, October 12, 1987 at 1 (reporting demonstration of satellite transmission of MUSE to Ottawa, and Washington, D.C.).

8/ Multichannel News, October 26, 1987, at 11 (reporting successful test of MUSE transmission over cable by NCTA in Alexandria, VA during the week of October 12, 1987).

allocations policies of the FCC for adequate spectrum to carry ATV.

The broadcast industry, as detailed below, is proceeding actively to investigate and develop viable ATV options and, in particular, ATV systems which can be provided over 6 MHz-wide channels and which are compatible with current NTSC receivers. But the feasibility and competitiveness of such systems in both the near and longer term future are far from clear. It is still quite possible, indeed likely, that local broadcast ATV will require additional spectrum.

C. The Public Interest In Competitive, Local, Universal Service Makes It Imperative That Local Broadcasters Have The Opportunity To Compete In Providing High-Quality ATV Service.

The public, too, has a great interest in seeing that local broadcasters can implement a competitive, high-quality ATV service. Indeed, ensuring that local broadcasters have the opportunity to provide ATV service serves three goals which the Commission has identified with the public interest: first, it promotes competition and diversity by maximizing the viewing choices available to consumers; second, it ensures the vitality of the system of over-the-air broadcasting designed to serve local communities; third, it preserves the value of the free, universal service provided by local broadcasters.

1. Competition.

As part of its statutory mandate to "generally encourage the larger, more effective use of radio in the public interest," the Commission has "consistently pursued policies intended to develop a nationwide television system that maximizes diversity and choice in television services." Carriage of Television Broadcast Signals by Cable Television Systems, 1 FCC Rcd. 864, 879 (1986). Competition promotes the availability of a greater variety of programming from diverse sources; it encourages programmers to be more attentive to viewers' program interest and choices; and it ensures that services are available to consumers at competitive prices. "[A]n open, competitive market where there is potential for access by all suppliers of video program services should operate to provide the mix of programming and viewing choices that most effectively meets public demand." Id. at 881.

The Commission has increasingly emphasized that the most appropriate way to promote diversity and choice is by removing barriers to competition, including technical barriers, to ensure that one service is not favored over another in its ability to provide service. "[I]t would not serve the interests of video consumers to maintain policies that favor any group of program service providers to the exclusion of other competing service providers. . .." 1 FCC Rcd. at 880.

The long history of efforts to reduce barriers to competition associated with the disparity in technical capabilities of UHF and VHF stations through the All Channel Receiver Act[9/] and regulatory policies[10/] illustrates the point. In no small part due to the Commission's efforts, the number of UHF stations has grown from 84 in 1959 to over 665 today.[11/]

The Commissions efforts to promote competition are also reflected in the decision to allocate vast quantities of spectrum for the express purpose of creating a new direct broadcast satellite ("DBS") for home delivery to compete with local broadcasters. Direct Broadcast Satellites, 90 F.C.C. 2d 676, 680-82, 685 (1982). And, even more to the point, in allocating spectrum for DBS, the Commission expressly adopted a channel configuration which would be receptive to HDTV use. Id., at 688.

The disparity between VHF and UHF television pales in comparison to the disparity between today's NTSC and the improvements promised by ATV technologies such as MUSE, and the Commission's efforts to ensure that DBS systems will be

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9/ P.L. 87-529, 76 Stat. 150 (1962), 47 U.S.C. § 303(s) (1982).

10/ Improvement of UHF Television Reception, 90 F.C.C. 2d 1121 (1982).

11/ Id. at 1122; FCC, Broadcast Station Totals As Of August, 1987.

able to deliver MUSE reflects the importance that high-quality ATV service will have in the future. There is little question that exclusion of local broadcasters from the ATV market would substantially reduce competition by segmenting the market and consigning one of the most vigorous competitors to secondary status.

2. Local Service.

The ability of broadcasters to deliver ATV service and remain competitive takes on particular importance because of broadcasting's unique role in providing local service to the public. The structure of terrestrial broadcasting, beginning with the Table of Allocations, has been designed to ensure that "as many communities as possible should have the opportunity of enjoying the advantages that derive from having local outlets that will be responsive to local needs." Television Assignments (Sixth Report and Order), 41 F.C.C. 148, 172 (1952). Congress and the Commission have repeatedly reaffirmed the goal of fostering "a television system which will serve all the people, encourage local outlets, foster competition -- particularly in larger markets -- and meet educational needs." H. R. Rep. No. 1559, 87th Cong., 2d Sess. 3, 9 (1962).

Realization of this goal has not been limited to efforts to preserve the competitive position of local broadcasting. The local service policy has also been based

on the recognition that local stations fulfill a unique role by providing local news and information, locally-oriented programming, and an outlet for local viewpoints. And only terrestrial broadcasting, of all home video media, has a public broadcasting, noncommercial set-aside which guarantees the availability to the public of not just local programming but local educational programming. Television Assignments (Sixth Report and Order), 41 F.C.C. at 50-53; Revision of Program Policies Related to Public Broadcasting, 98 F.C.C. 2d 746, 747-49 (1984). The Commission's efforts to promote the "public interest" in local television "has always been driven by a concern that issues of importance to the community will be discovered and addressed so that the informed public opinion necessary to a functioning democracy, will be possible." Deregulation of Commercial Television Stations, 98 F.C.C. 2d 1076, 1091 (1984).

But these policy statements are not the only evidence of the value and importance of local service. There is an established public demand for news, public affairs and local programming and local stations have consistently met this demand. Id., at 1081-82. Television is the public's primary source of news and information. On average, approximately 13% of local stations' programming is devoted to news and public affairs and over 10% is devoted to local programming. Id., at 1081. Almost 16% of local

stations' total expenses are devoted to news programming.[12] The average is even higher in the largest, most competitive markets.

There is no substitute for local broadcasters in this area. Alternative video delivery services such as DBS and VCRs are inherently national services.[13] Moreover, cable and other services do not have an established tradition of providing issue-responsive programming. Thus, despite its increased reliance on marketplace forces to serve the public interest, the Commission has continued to emphasize that Sections 303(a) and 307(b) of the Communications Act make it essential to preserve the viability and competitiveness of a local broadcast service.[14] "[T]he complete displacement of expressive outlets attuned to the needs and concerns of the communities they serve not only would contravene a long-standing

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12/ See National Association of Broadcasters, 1985 Television Financial Report, at 6.

13/ While cable in theory could eventually "cluster" its ownership patterns or develop local programming consortia, the practical realities are such that it will be many years, if ever, before cable provides such services. And, in any event, because of the inherently fewer number of cable outlets in each market, reliance on cable would result in a net reduction in diversity.

14/ See, e.g., CATV Syndicated Program Exclusivity Rules. 79 F.C.C. 2d 652, 795 (1980); Economic Relationship Between TV Broadcasting and CATV, 71 F.C.C. 2d 632, 644 (1979); See also Quincy Cable TV, Inc. v. Federal Communications Commission, 768 F.2d 1434, 1455 n. 45 (D.C.Cir. 1985).

historical tradition of locally oriented press but might well itself disserve the objective of diversity." Quincy Cable, 768 F.2d at 1462.

3. Free, Universal Service

Finally, local broadcasting is also unique in that it provides universal, free service. Local stations cover at least 99 percent of all American households. Scrambling of Satellite Television Signals, 2 FCC Rcd. 1669, 1691-92 (1987), and approximately 80% of all television viewing is of local stations.15/ As the Commission has reported, by 1985, there were already 196 million television receivers in use, or more than two receivers for every household in the United States. The production of television receivers in the United States alone in 1984 represented a $6.3 billion industry.16/

It is well-established that over-the-air broadcasting provides public welfare benefits substantially in excess of its cost to consumers, though the precise value

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15/ Multichannel News, December 8, 1986, at 49.

16/ FCC Office of Congressional Affairs, Office of Plans and Policy, "The FCC and the American Economy," (July, 1986) (hereinafter, "FCC Economy Report"). The figures cited in the report are taken from the Electronic Industries Association, Consumer Electronics Annual Review, 1985 ed., at 50.

of this "subsidy" is difficult to determine.[17/] Local television revenues, representing a minimum value for television programming, totalled $11.5 billion in 1985. The actual value provided by free broadcasting is much larger. Economic models estimating the gross value of this programming (and the value of the subsidy provided by free local television) suggest that the value may have been as high as $81.2 billion in 1985.[18/]

These figures underline how much the public has at stake in broadcasters' efforts to develop ATV technologies that will be appropriate for terrestrial broadcast. They also make it apparent that the availability of ATV technology over local broadcast stations will significantly enhance the quality and value of the video programming delivered to viewers, sustain and enhance the quality of local service, and maintain the benefits of competition.

17/ Noll, Peck, and McGowan, Economic Aspects of Television Regulation at 20-36. (Washington: Brookings Institution, 1973).

18/ FCC Economy Report, at 7-11 (based on economic studies in Noll, et al., supra at 21-25, 30, 277-88). The magnitude of television's value is even more evident when compared to other figures in the FCC Economy Report. The Report estimates the minimum annual value of all mobile communications at only $2.5 billion. Id., at 15. The annual expenditures for all satellite communications services was placed at a mere $500 million. Id., at 19.

II. THE EVALUATION OF ADVANCED TELEVISION SYSTEMS.

As the NOI notes, "developments of ATV technologies for terrestrial transmission and reception of broadcast signals are at an early stage." NOI, at ¶ 20. Consequently, specific answers to many of the questions raised by the Commission regarding the evaluation of such systems (see NOI, at ¶ 38, Quest. 1-5.) are not yet available. The broadcast industry has already initiated an effort to (A) articulate evaluation criteria for ATV systems; (B) stimulate system development; and (C) establish mechanisms to test and evaluate the systems, including, in particular, their spectrum needs and interference protection requirements. It is anticipated that broadcasters will work closely with the FCC's ATV Advisory Committee and its working groups in generating this information.

A. Evaluation Criteria.

The criteria to be considered in evaluating ATV systems fall into two rough categories: (1) the performance criteria necessary to assess relative system quality; and (2) the implementation criteria needed to assess system feasibility, practicality, and implementation costs.

1. Performance Criteria.

The first step in evaluating ATV systems is to assess the relative importance to consumers of both individual system features and the different combinations of such features provided by particular systems. This

information is generally obtained through the mechanism of "psychophysical" testing. It is anticipated that the Planning Subcommittee of the ATV Advisory Committee, working in conjunction with the National Association of Broadcasters, the Advanced Television Systems Committee ("ATSC") and others, will collect and evaluate the existing psychophysical data and, as necessary, commission the collection of whatever further data is necessary to enable the Advisory Committee to make recommendations as to the features of a local broadcast ATV system needed to provide a quality competitive with that of alternative media.

Though this process is still at a very early stage, some preliminary observations are in order. First, already-conducted evaluations of ATV systems, while preliminary, indicate that a competitive ATV system probably will require advancements that go beyond the quality associated with improved NTSC systems, NOI, at ¶ 21-26, and enhanced 525-line systems, NOI, at ¶ 27, and achieve the level of quality associated with HDTV systems, such as NHK's MUSE system. NOI, at ¶ 29-38.[19/] Unlike improved NTSC and enhanced 525-line systems, HDTV systems not only aim to correct interlace/color and quality defects of NTSC, but

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19/ Of course, many of the technologies used in improved NTSC and enhanced 525-line systems are also used, along with other technologies or proposed technologies, in HDTV systems.

offer a wider aspect ratio to convey a greater sense of realism for the viewer and improve picture resolution, a net enhancement comparable to the difference between 35 mm and 16 mm film.

Second, although the imminent introduction of the MUSE system in the United States has served as the catalyst for the broadcast industry's ATV initiative, the assessment of ATV performance must focus not merely on what is necessary to achieve comparability with MUSE in the very near future, but rather, what will be necessary to maintain comparability with other media for the foreseeable future. In particular, it now appears that within the next decade or so, either telephone companies or cable companies or both will bring almost infinite transmission bandwidth into individual homes by means of fiber optic cables. By definition, these cables will permit the introduction into the home of ATV systems which are subject to few if any of the bandwidth- versus-quality trade-offs facing all of the currently proposed ATV transmission systems. Planning decisions, and especially spectrum allocations decisions, must be based on the long-term prognosis for television system advancement.

With these considerations in mind, it appears possible at this juncture to identify several performance criteria which almost certainly will be fundamental in assessing the relative significance to consumers of the ATV

systems being developed and those which will be developed in the future:

a. Aspect Ratio.

As mentioned above, psychophysical tests have confirmed that aspect ratio is of great importance to viewers and that viewers have a strong preference for wider aspect ratios than the current NTSC width to height ratio of 4:3. Ratios of 5:3 to 16:9 (5.33:3) appear to be desirable given present technology and research.

b. Static resolution.

The 340-line effective resolution of the current NTSC system makes it impossible to depict fine detail and produces a visible line structure when used for large displays or at an unacceptably short distance from the receiver. NOI, at ¶ 13. Psychophysical tests indicate that resolution must be improved to two or more times that of the present 525 system to remove these defects. The MUSE system has addressed this problem by using 1125-line interlace scanning that approximately doubles both the horizontal and vertical resolution. Other systems propose the use of various combinations of improved line structure and scanning techniques to improve resolution. The relative abilities of the systems to provide satisfactory static resolution will be of prime importance.

c. Luminance and chrominance artifacts.

As discussed in the NOI, at ¶¶ 15-16, the present NTSC system is subject to a number of color and luminance defects as a result of the decision to interleave the chrominance and luminance signals in a way that would not render monochrome sets obsolete. In addition, the limited chrominance and luminance bandwidth of the NTSC system does not permit display of the full range of contrast and color that is visible to the human eye. A number of receiver and transmission technologies have been proposed for remedying these defects to achieve more accurate and realistic video display. Elimination of these defects is a basic goal of all of the ATV systems currently under development.

d. Improved high-quality multi-channel sound.

The present NTSC sound signal is also subject to significant bandwidth limitations and compromises introduced in order to make the transmission technique compatible with monophonic receivers. The defects created by these limitations are increasingly apparent as consumers become accustomed to, and expect, the quality available through digital sound equipment. Consequently, MUSE provides compact disc quality sound and other proposed systems seek similar improvements.

e. Motion fidelity.

The NTSC system is subject to a number of noticeable motion artifacts. NOI, at ¶ 10, 14. ATV systems

may be subject to these, or other artifacts. In fact, all of the HDTV systems being proposed for terrestrial or satellite transmission, including MUSE, sacrifice some of the quality and motion fidelity of "full-HDTV" systems, which require as much as 30 MHz, in order to be more spectrum efficient. For example, the sampling system used by the MUSE system to compress the signal to 8.1 MHz introduces a number of motion artifacts in the display that are regarded as excessive by some viewers. The effect of bandwidth compression techniques being proposed by other systems is still largely unknown. Evaluating the effect of these techniques and the trade-offs posed by different systems will be a major focus of psychophysical analysis of new systems once they become available for testing.

2. Implementation Criteria.

The performance criteria discussed above must be considered in conjunction with the requirements for practical and economical implementation of HDTV for local broadcasters. These requirements will be the focus of the Advisory Committee's Implementation Subcommittee. While the subcommittee undoubtedly will develop a more comprehensive list of implementation planning factors, MST believes that the following criteria must be among them:

a. NTSC-Receiver Compatibility.

As the Commission has already emphasized in the NOI, great weight must be given to the ability of any ATV

system to be viewed on existing NTSC receivers. NOI, at ¶ 83. To be genuinely compatible it must be possible for existing receivers to decode the signal to display an NTSC-quality picture with minimal or no degradation of quality without the use of a converter, or at worst, with a very simple and very inexpensive converter.

b. Channel Compatibility.

Compatibility with broadcasters' existing 6 MHz channels is also extremely important. Full "channel compatibility" means the ability to implement ATV without disturbing the present system of allotments, a very high priority for current broadcasters. As detailed below, see Section III. B.I, it may be possible to accomplish this objective either through a single-channel 6 MHz ATV system or through the use of existing channels and an augmentation channel of 3 to 6 MHz in width.

c. Efficient bandwidth compression.

All of the ATV systems currently being proposed for use by local broadcasters employ bandwidth compression techniques to maximize the spectrum efficiency of the system. Efficiency of the compression system is not strictly a matter of the amount of spectrum employed, but depends on the ability of the system to deliver a high-quality, competitive ATV display, which carries the potential for significant additional improvement.